United States Patent [19]

Raschle

[11] **3,763,642**

[45] **Oct. 9, 1973**

[54] **FALSE TWISTING APPARATUS**

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[73] Assignee: **Heberlein Patent Corporation,** New York, N.Y.

[22] Filed: **Apr. 17, 1970**

[21] Appl. No.: **29,525**

[30] **Foreign Application Priority Data**

May 21, 1969 Switzerland.....7694/69

[52] **U.S. Cl.** **57/77.45**

[51] **Int. Cl.**..... **D02g 1/06**

[58] **Field of Search**...57/77.3–77.45, 34 HS; 74/210

[56] **References Cited**

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[57] **ABSTRACT**

Apparatus for false-twisting yarn wherein two axially parallel pairs of discs form a throat, and a twist tube for crimping textile yarn is supported tangentially against the peripheral surfaces of the discs in the throat therebetween and is pressed against same by magnet means, the twist tube comprising a central portion equipped with a jacket consisting partially of non-magnetic material having cylindrical zones on both sides of its center which zones are formed of material having low magnetic loss characteristics, these zones being positioned opposite the poles of the magnetic means to assure diametral magnetic flux through the tube.

4 Claims, 5 Drawing Figures

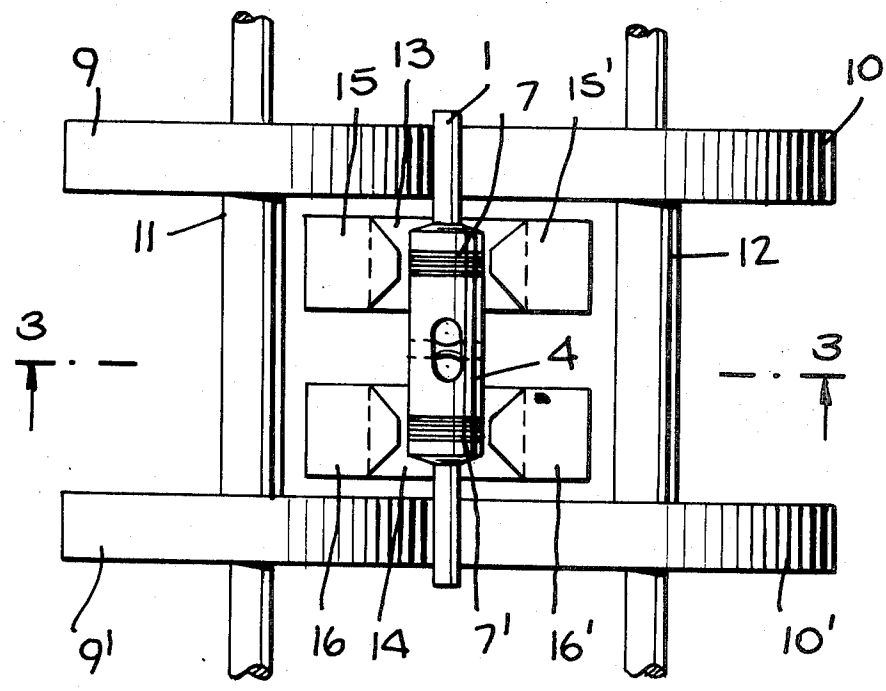

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Fig. 1.

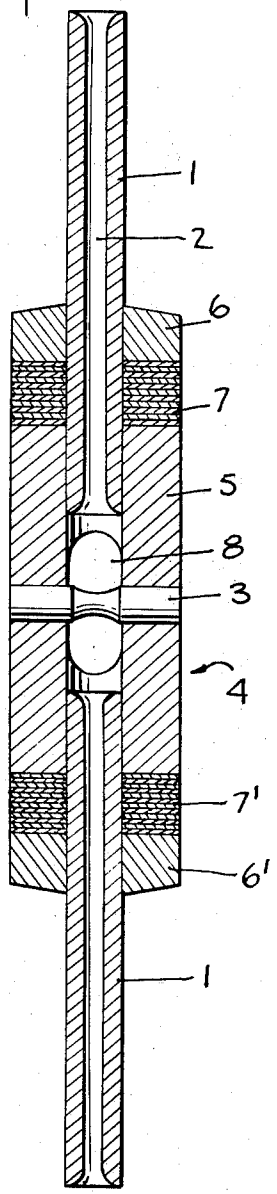


Fig. 2.

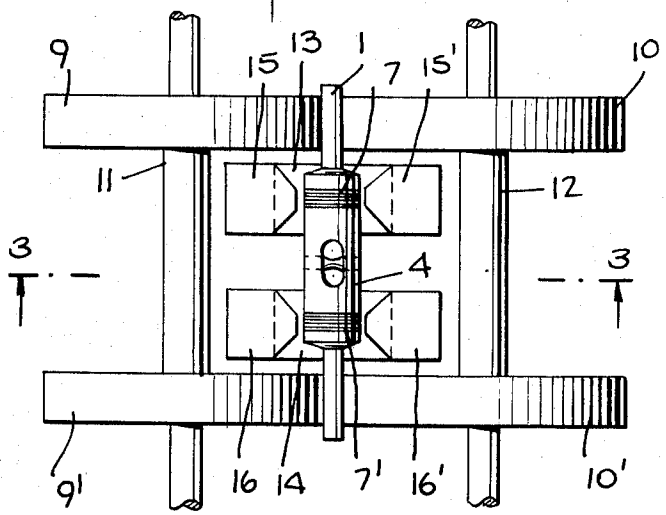
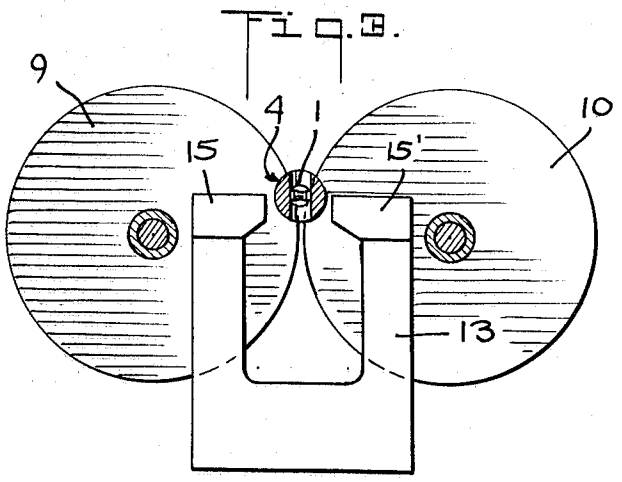


Fig. 3.



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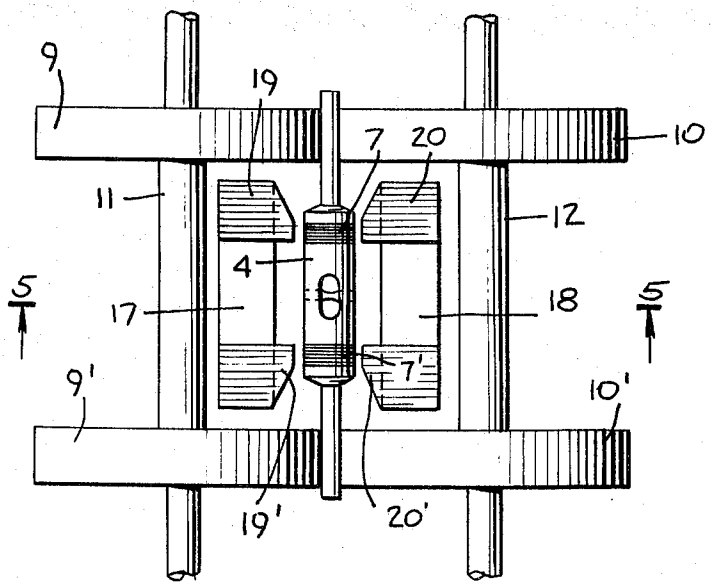

Fig. 4.

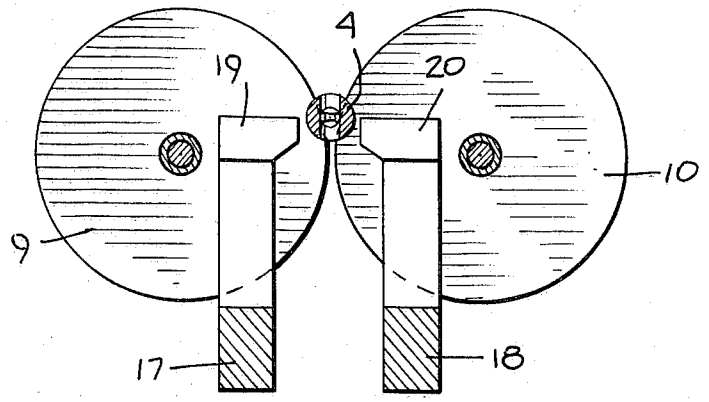

Fig. 5.

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FALSE TWISTING APPARATUS

This invention relates to a device for imparting a twist to a running length of textile yarn, and more particularly to apparatus for false-twisting such yarns.

As is known in the art, the false-twist process is applied to lengths of textile yarns while the yarns advance longitudinally. Thus, for any given number of twists per unit of length sought to be applied to the yarn, the speed of advance of the yarns is limited by the speed of revolution of the false-twist spindles or tubes. It follows that if the speed of production of yarns textured by the false-twist process is to be increased, then the speed of rotation of the spindles or false-twist tubes must also be increased.

False-twist devices are already known which comprise twist tubes arranged in the throat formed by two axially parallel rollers and in tangential contact with the surfaces thereof, one of the rollers being driven and the other being an idler roller, the twist tubes being pressed against the rollers by magnetic means. In a particular form of such device described in U.S. Pat. No. 3,267,657, each of the rollers consists of two parallel discs maintained at equal axial distances by means of spacers, and the magnetic attraction is provided by means of a permanent magnet arranged between the discs and adjacent the spacers. The twist tube is equipped with a central part of larger diameter than that of its extremeties and formed by a stack of discs of sheet iron or the like, having low magnetic loss characteristics. This known false-twist device has achieved considerable commercial acceptance and has contributed increased production speeds by reason of enabling speeds of revolution of the twist tube of the order of several hundred thousand revolutions per minute.

I have conceived by my invention a false-twist device of the class described by which even higher speeds of revolution may be achieved. Thus, my invention consists essentially in apparatus for the crimping of textile yarns by the false-twist process which comprises, two axially parallel pairs of discs arranged to form a throat therebetween, a twist tube supported in tangential contact with the peripheral surfaces of the discs and magnet means pressing the twist tubes against such surfaces. According to my novel construction, the twist tube comprises a central zone or region of larger diameter than that of its extremeties, and this central part is formed primarily of non-magnetic material, but has spaced cylindrical zones formed of material having low magnetic loss characteristics, these zones being positioned opposite the poles of the magnetic means so as to assure diametral magnetic flux through the twist tube.

More specifically, the central part of the tube has a median zone and two end zones formed of the non-magnetic material, while the zones of material of low magnetic loss characteristics are positioned between the median and end zones of the central part of the tube. Preferably, the two cylindrical zones of magnetic material may consist of a stack of discs of sheet iron, for example.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be

described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception on which this disclosure is based may readily be utilized as the basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of the invention.

A specific embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings which form a part of this specification wherein:

FIG. 1 is an enlarged central longitudinal cross-sectional view of a twist tube in accordance with the present invention;

FIG. 2 is a front elevational view of one form of false-twist device according to the present invention;

FIG. 3 is a cross-sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is a view similar to that of FIG. 2, but illustrating a second embodiment of the invention; and

FIG. 5 is a cross-sectional view taken along the line 5—5 of FIG. 4.

Referring now to the drawings, and more particularly to FIG. 1 thereof, there is shown a tube 1 formed of a hard metal such as wolfram carbide for example, provided with a longitudinal axial bore 2 and a pin 3 perpendicular to the bore 2 and located at the center of the tube. A jacket 4 of relatively large diameter surrounds a central part of the tube and has a median zone 5 and two extremeties 6,6′ formed of non-magnetic material, such for example as a titanium-aluminum-vanadiam alloy, the median zone being separated from the extremities by stacks 7,7′ of adjacent discs formed of sheet iron having low magnetic loss characteristics, the discs being annular in configuration and surrounding the tube 1.

A central bore 8 extends through the jacket 4 and tube 1 and is perpendicular with respect to the pin 3, thus making it possible to thread a yarn to be textured through the tube and to wind the same about the pin 3.

Turning now to FIGS. 2 and 3, there are shown two axially parallel pairs of discs 9,9′ and 10,10′ which may be formed of a suitable synthetic material such as "Vulcolan", for example. The respective discs of each pair may be separated by spacers 11 and 12; and one pair of discs may be driven while the other idles, as is already known to those skilled in the art. The twist tube 1 is positioned in the throat formed between the discs 9, 10 and 9′, 10′ with its longitudinal axis parallel to the axes of the discs. It will be seen that the portions of the tube which extend beyond the jacket 4 contact the peripheral surfaces of the discs so that when the driven pair of discs are rotated, it will effect rotation of the tube 1 which in turn will cause the idler pair of discs to rotate.

In the embodiment of the invention illustrated in FIGS. 2 and 3, two permanent horseshoe magnets 13, 14 are arranged between the discs 9, 10 on the one hand and 9′,10′ on the other hand, such that the U-planes of the magnets are parallel with each other and perpendicular with respect to the axis of the twist tube. The poles 15,15′ of the magnet 13 are positioned opposite the stack of low magnetic loss material 7 of the jacket 4; and the poles 16,16′ of the magnet 14 are positioned opposite the stack 7′, whereby the lines of

magnetic flux pass diametrally through the twist tube.

It will be appreciated, of course, that instead of using two-pole horseshoe magnets, it is also possible to use a four-pole horseshoe magnet, the U-plane of which is perpendicular with respect to the axis of the twist tube; and, in fact, suitably positioned bar magnets may be used.

As shown in FIGS. **4** and **5**, the organization of parts is essentially the same as that already described except that the U-planes of magnets **17, 18** are parallel with respect to the axis of the twist tube. In this case, the poles **20, 20'** are adjacent one side of the stacks **7,7'**, respectively, while the poles **19, 19'** are adjacent the same stacks, respectively, the poles being arranged so that the lines of flux pass diametrally through the stacks, as is the case with the embodiments already described.

From the foregoing description, it will be seen that I contribute a false-twist device of the class described wherein the stacks of discs of magnetic material on the tube are so positioned relatively to the poles of the magnets, that eddy current and hysteresis losses may be kept to a minimum; and by dividing the material of low magnetic loss characteristics into two separate stacks, an improved dissipation of the heat produced by the eddy currents is obtained. My contribution also makes it possible to produce a twist tube wherein the entire jacket need not be formed of low loss magnetic material as in known prior apparatuses, so that the jacket may be produced essentially from nonmagnetic material with a low specific weight and high specific resistance. Additionally, my novel device permits the availability of a high force to restore the twist tube axially to its normal position relatively to the magnetic poles, and by the same token, relatively small axial displacements are encountered so that the twist tube may be relatively shorter and thus more rigid than known twist tubes, wherefore higher resonance frequency and higher critical speeds of revolution of the twist tube are obtained.

I believe that the construction and operation of my novel false-twisting apparatus will now be understood and that the advantages of my invention will be fully appreciated by those persons skilled in the art.

I claim:

1. In apparatus for false twisting textile yarns which include a pair of rollers, at least one of which is driven, spaced one from the other to form a crotch therebetween, a yarn twist tube positioned in said crotch in frictional engagement with the peripheral edges of said rollers at portions substantially spaced longitudinally of said tube and having means for imparting a twist to yarn passing therethrough upon rotation of said tube, and magnetic means having magnetic poles located between the axes of said rollers and acting on said tube between said spaced portions to maintain the tube positioned in said crotch and in said frictional engagement; the improvement which comprises a jacket extending longitudinally of and surrounding the central part of said tube and which consists essentially of non-magnetic material and contains, on both sides of a relatively long median zone thereof, a relatively short annular zone of material having low magnetic loss characteristics, each said annular zone being arranged between two magnetic poles of said magnetic means whereby the magnetic lines of flux flow diametrally throug the twist tube.

2. Apparatus according to claim **1**, characterized in that each of the two annular zones of the jacket of the twist tube consists of a stack of adjacent discs of sheet iron of low magnetic loss characteristics.

3. In a twist tube of the class described including, a body having a longitudinal bore, means in said bore about which a yarn extending through said bore may be wound, the improvement which comprises a jacket surrounding a portion of said tube and having a single relatively long median zone of non-magnetic material extending longitudinally of said body and two extremities of non-magnetic material the median zone being separated from each extremity by a relatively short cylindrical zone formed of material of low magnetic loss characteristics.

4. A twist tube according to claim **3**, characterized in that said relatively short cylindrical zones are formed of stacked annular discs of iron.

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